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HOSPITAL TECHNICAL MEMORANDUM

MAINTENANCE OF BUILDINGS, PLANT AND EQUIPMENT

12

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DEPARTMENT OF HEALTH
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HOSPITAL TECHNICAL MEMORANDUM NO. 12

Maintenance of Buildings, Plant and Equipment

CONTENTS

I Scope.

II Development of a maintenance plan.

III Direct labour or contract work.

IV Management of maintenance work.

V Financial control and administrative arrangements.

VI Conclusion and summary.

Appendices:

A The annual plan.

B Production of a monthly work programme.

C Control over implementation of programme.

I. Scope

1. This Memorandum discusses the administrative arrangements needed effectively to plan and control the maintenance of hospital buildings, plant and equipment.

2. It is based on several detailed studies of maintenance work carried out by the Hospital O. & M. Service, on visits and discussions with hospital authorities operating planned maintenance systems, and on an examination of preventive maintenance systems operated in industry.

II. Development of a maintenance plan

Introduction

3. The hospitals of the future may present special maintenance problems. Modern buildings and services are very complex and demand regular maintenance if excessive deterioration is to be avoided. A properly constructed planned maintenance programme will ensure that, (*a*) the building is maintained in good shape from the beginning, and (*b*) the situation never arises where there is a doubt as to whether heavy repairs with escalating costs could have been avoided.

4. Each hospital authority has forward looking development plans for its group which, as far as is practicable, determine the probable life of existing buildings, etc., provide for change of use of premises, for the disposal of some, and for the extension and/or rebuilding of others. All officers concerned with the development and operation of the maintenance plan should be aware of probable future changes when deciding what maintenance work is justified.

5. In planning the maintenance programme, a clear distinction needs to be drawn between expenditure properly attributable to maintenance and expenditure on capital works, and the latter kind of work should not be undertaken by maintenance staff to the detriment of their proper job; some maintenance jobs, however, may occasionally include an element of capital development.

6. Major capital works will be planned by architects and engineers, and carried out by contractors. Nevertheless, the senior engineering and building staff of the hospital should be taken into close consultation during the course of planning and construction so that due consideration is given to future maintenance requirements. Where small capital schemes are designed and carried out entirely by hospital staffs, the question of future maintenance requirements forms a natural part of the work of the hospital engineer and building supervisor. Information about defects in operation acquired through maintenance work should be fed back to architects and engineers so that it may be taken into account in planning later capital schemes.

Specifying maintenance requirements

7. Maintenance tasks for which provision needs to be made in a planned programme include:

(*a*) Routine inspections, oiling and replacement of defective parts of electrical and mechanical plant and equipment.

(*b*) Routine inspections of mains services installations, e.g. water, electricity, and replacement of worn washers, defective plugs, etc.

(*c*) Renovation of premises, internally and externally.

(*d*) Major overhauls or replacements of major items of plant, services and equipment.

(*e*) Contingencies and breakdowns.

(a) Routine inspections and maintenance of mechanical and electrical equipment

8. Practically all the plant and equipment in a hospital requires some maintenance attention at least once per year (e.g. as in the case of insurance inspections of boilers, etc.) and possibly as often as once per day (e.g. daily oiling of automatic stoking devices, etc.). Each item has its own requirements which, once established, repeat from year to year. The routine maintenance of plant and equipment, therefore, can be planned on an annual basis and the plan as a whole will repeat year after year, subject to any amendments found necessary in the light of experience and to changes in plant and equipment.

The advantages of such a plan are:

(i) plant and equipment is regularly inspected and maintained and deterioration is brought under control;

(ii) breakdowns are almost eliminated;

(iii) the interval between replacements of items is extended;

(iv) work can be done at convenient times without disruption to the normal services;

(v) the volume of work becomes a known, rather than an unknown, factor for staffing and financial control purposes.

9. The first step in the preparation of an annual plan is to set up a master record of all items of plant and equipment which require maintenance; and to specify for each item what kind of maintenance

attention is necessary and the frequency with which the work should be carried out. It will also be appropriate in most instances to indicate the most efficient method of undertaking the job.

10. The attention to be given to each item will be influenced by the safety and efficiency requirements, some of which are specified in law. The inspections and tests necessary can usually be ascertained from the manufacturers of the equipment, who should also be asked to describe permissible test tolerances where these are appropriate. Much of the necessary information will be given in service manuals supplied by the manufacturers but in some cases special enquiry will need to be made. Account must always be taken of experience in the use of the equipment under hospital conditions. The information should be recorded by reference to the appropriate items of equipment. The final decision on which should be recorded must be the responsibility of the engineer or building supervisor.

11. It is important to ensure that the master record identifies the whereabouts of every significant item of plant and equipment. A code letter or number should therefore be allocated to each item of equipment, or plant, which merits separate individual maintenance care and details given of its exact location. The relevant codes should be shown on all records and correspondence relating to subsequent maintenance operations.

12. A number of different record systems are used in industry in operating planned inspections and maintenance of plant and equipment although they all have similar characteristics. Some discussion of the essential details is set out in paragraphs 36–39.

(*b*) *Routine inspections of mains services installations*

13. When these inspections are not included in the inspection of individual items of equipment, the routine can, as a rule, be organised on an area or departmental basis at regular intervals; the frequency of inspections needs to be decided in the light of experience. Consideration should be given to organising this work to fit in with the painting programme, which is by far the largest recurring element in routine building maintenance.

(*c*) *Renovation of premises, etc.*

14. It is a useful practice to plan renovation work, particularly repainting and washing paint-work, on a rota basis which enables rooms and corridors to be attended to in a sequence, related to the variations in the use of different classes of accommodation.

15. Most of the work coming under this heading will be easily identifiable as jobs of some size, and some will include a recognised and approved element of development and improvement, viz.,

painting maintenance, including washing down;

adaptations;

road and path repairs;

drainage and sewage works;

roof and guttering maintenance;

pointing of brickwork;

floor finishes;

electrical re-wiring, etc.

16. In addition to these comparatively large works, in many hospitals at present there are many minor jobs, some of which fall into the category of improvement rather than true maintenance, e.g.,

replacement or repositioning of lavatory basins and sinks;

provision of extra electric power points;

modification of shelves and storage accommodation;

flush panelling of doors;

provision of extra radiators, electric and gas fires, etc.

modernising lighting;

modifications to laboratory benches, etc.

repositioning of departmental fitments and equipment;

manufacture of special equipment, e.g. for physiotherapy departments;

replacement of cisterns and water tanks, etc.

17. The items listed in the previous paragraph can mount up substantially in the course of a year with considerable impact on expenditure. They can also lead to additional work and expense if jobs are incorrectly phased, e.g. when the replacement or repositioning of fittings takes place immediately following redecoration rather than before it. Irrespective of size, all individual jobs of this nature need to be identified at annual intervals and included in the annual plan of building maintenance work. This requires that each year the whole of the hospital should be reviewed objectively to decide what has to be done, and when it should be done, bearing in mind not only current need but also the implications of the forward looking development plans.

18. The annual programme of renovations will include:

(1) work proposed by heads of departments, etc.

(2) work which the engineer/building supervisor will have forecast, including practically all external work.

The first category of jobs will ordinarily involve consultations between the heads of departments and the central administration and the engineer/building supervisor. Much of the work in the second category will result from the annual surveys of building, plant, equipment and services by the engineer/building supervisor. In each case, the necessary inspections and discussions need to be completed in good time for the preparation of

financial estimates, the main object being to identify work which must be carried out in the next financial year and to forecast future likely requirements.

19. The initial proposals of heads of departments can be ascertained by circulating an enquiry asking for details of work required in the departments under the following headings:

Internal painting

Washing down

Renewal or repositioning of fittings (e.g. sinks, lavatory basins, etc.)

Minor improvements

Expenditure on other building or engineering work.

20. The heads of departments should also be asked, where appropriate, to state the period in which the work should be done to meet functional requirements. In particular they should be asked to state whether work must be done out of normal working hours.

(*d*) *Major overhauls or replacements of major items of plant, services and equipment*

21. Renewal or repair of major plant, services and equipment, or the renewal of engineering services, will usually arise so infrequently that it will be planned as a separate operation.

(*e*) *Contingencies and breakdowns*

22. However carefully the system of regular inspections is built up emergencies and breakdowns will still occur because of human failings, if for no other reason. Sterilisers will be allowed to boil dry, windows will get broken and electric points will be accidentally damaged. To cope with these there needs to be machinery for:

(i) their prompt notification;

(ii) their prompt repair (or eventual repair if no urgency);

(iii) ascertaining the reason for them;

(iv) preventing their repetition.

23. Except in emergencies the notification of faults by heads of departments should be in writing. Urgent work requested by telephone should subsequently be confirmed in writing. In most hospitals duplicate or triplicate request forms are in use. Experience has shown that although the use of such forms is quite common, in many hospitals the system breaks down because:

(i) works departments do not trust the sketch description of faults given by requisitioning officers and prefer to see for themselves;

(ii) heads of departments do not rely on them because they take too long to reach the works departments.

24. Requisitioning officers should be asked to state clearly:

(*a*) what is faulty;

(*b*) in what way it is faulty.

For example, "light fused" on a request form from a ward with, say, strip lighting, 150 watt bulbs in ancillary rooms, and 60 watt bulbs in bedside lamps can mean little or nothing to the engineer when he receives it. On the other hand, "Bed No. 3, bedside lamp, unserviceable; no apparent damage" immediately indicates the precise location of the fault and suggests that all that is required is the replacement of a 60 watt bulb and/or a fuse. A code of practice for the guidance of requisitioning officers could be printed, perhaps on the front cover of requisition pads, and would do much to encourage a higher standard of requisitioning.

25. Heads of departments would place greater reliance on written request forms if they could be assured that urgent work would be done on the day of the request and less urgent work, say, within two or three days. Such service is only possible, however, if there is a routine for the submission of, and attention to requests. All requests should be submitted to the engineer by, say, 9.30 a.m. each day; i.e. at a time which enables the heads of departments to see if there are any contingencies arising whilst still leaving the engineer/building supervisor sufficient time to put the faults right before the end of the normal working day if necessary. Except for emergencies, faults not notified by 9.30 a.m. would be left to the next day. Particularly under planned maintenance, most of the request forms will refer to work which must be done and there is no point in delaying requests by sending them all via the hospital secretary. It should be sufficient for the engineer/building supervisor to refer to the hospital secretary any requests which require prior approval, e.g. those which refer to the provision of additional facilities, etc.

26. It may not be possible to undertake some of the work for days or weeks because of delay in delivery of materials, etc. When this is so, the requisitioning officer concerned should be notified in writing and, if necessary, temporary expedients agreed with him.

27. When breakdowns have been found to be caused by carelessness or human error the head of the department concerned should be notified in writing. In extreme cases, particularly when persistent carelessness is evident, copies of the notifications should be sent to the hospital secretary. In many hospitals at present up to 50% of the total maintenance budget can be absorbed in dealing with breakdowns and *ad hoc* requests. Within a year or two of the introduction of planned maintenance work it should be possible to reduce this figure to about 5%.

Compiling the annual programme

28. The comprehensive annual maintenance plan for each hospital can be expressed by amalgamating in tabular form the ascertained requirements for routine maintenance, renovations, etc., and major plant or equipment maintenance, and by making appropriate allowances for contingencies and breakdowns. (See Appendix A.)

(*a*) *Routine maintenance* (described in paras. 8–13 above)

29. The approximate amount of time needed in the different trades has to be estimated (*a*) in the first place from past experience and (*b*) later on from the total times calculated to be required to carry out the different tasks included in the annual planned maintenance programme, as described in paragraphs 30–35 below.

(*b*) *Building and engineering work not covered by routine maintenance* (described in paras. 14–21)

30. The compilation of an annual programme from the proposals, other than those covered by routine maintenance, of heads of departments and of the engineer/building supervisor, is not merely a collation exercise. Careful consideration of each item is required to:

(1) ensure it is necessary;

(2) ensure it is practicable;

(3) establish its relative priority.

31. The complete plan must, as far as possible, provide for a regular flow of work for the various categories of directly employed staff, unavoidable peaks of work being eased by selecting jobs to be put out to contract. The necessity and priority of jobs must be largely determined by discussions between the group administration, the hospital secretaries and the heads of departments: the practicability of individual items and the overall balance of the plan must be based largely on the technical judgment of the engineering/building supervisor.

32. The first stage of vetting proposals received from the departments would consist of discussions between the engineer/building supervisor and heads of departments, to establish the practicability of the proposals, e.g. whether the electric power supply can carry the extra load envisaged, or whether internal partitions can be moved without structural alterations, etc. The second stage of vetting would be undertaken by the engineer/building supervisor in consultation with each hospital secretary, when the collated proposals for each hospital would be examined to determine the relative importance of the proposals and to ensure that all relevant data was available, particularly regarding the importance of starting and finishing dates.

33. The final evolution of the plan for renovations of premises and other building and engineering work could take place at group level, on the following lines:

(1) The engineering/building supervisor would provisionally estimate costs for each item and suggest whether it should be done by direct labour or contract. For direct labour jobs the estimated costs would be divided between labour and materials as an aid to balancing work loads and making the appropriate financial provision.

(2) An *ad hoc* committee consisting of group officers and hospital secretaries would consider all items individually to:

(*a*) delete unnecessary jobs;

(*b*) allocate priorities to remaining jobs (two categories of priorities should be sufficient, e.g. first priority, jobs to be done in the next financial year; second priority, reserve jobs to be done in that year if resources become available or if a first priority item is deferred);

(*c*) fix starting and completion dates for individual jobs (to meet the functional requirements of the hospital, to ensure that jobs are done in the correct sequence, and to preserve an even flow of work throughout the year for all direct staff);

(*d*) ensure that sufficient contract work is done to enable the efficiency of the direct labour force to be tested;

(*e*) determine the total estimated cost of the work for the purpose of preparing financial estimates.

34. The programme as finally agreed would be summarised hospital by hospital, reserve items being kept separate, each job being allocated a permanent reference number, related jobs being numbered in sequence to indicate the order in which they should be done. On completion, the plan would be ratified by the appropriate committee and no departure from it would be allowed except in emergencies, and then only with the approval of the committee.

35. The existence of the plan would enable the engineer/building supervisor to prepare specifications and drawings, order materials for delivery by specified dates, and, when necessary, to seek tenders for contract work well in advance of the starting dates. A pipeline of work would be created to ensure that none of the resources of the building and engineering departments need be under-employed at any time.

Maintenance systems

36. Inspections, tests and maintenance of plant and equipment can be carried out by either direct labour or the manufacturers' maintenance department, but, irrespective of the means, a common method of control needs to be exercised.

37. In the case of direct labour the system should enable the engineer to allocate work to his staff; in the case of contract work it should control the issue of official orders so that the work is done at the appropriate intervals and at the convenience of the hospital.

38. A system of planned engineering maintenance, designed specifically to suit hospital arrangements and conditions, has been prepared by the Engineering Division of the Ministry of Health, and described in Hospital Technical Memorandum No. 13, Planned Preventive Maintenance: A System for Engineering Plant and Services, soon to be published.

39. There are several systems of records designed to assist in the control of routine inspections and maintenance of plant and equipment, but they all have the same basic pattern, i.e.:

(i) a master record for each item of plant and equipment or an inventory;

(ii) a bring-forward index, or action record, which assures that each item of plant and equipment receives appropriate maintenance at the stipulated intervals;

(iii) a system of reports to show the state of each item at the time of each test and to initiate any further action which may be necessary.

III. Direct labour or contract work

40. In most hospitals maintenance work is undertaken by a mixture of direct labour and contract work. Consideration must be given to achieving the most efficient division of work between the two.

Direct labour

41. In hospitals the urgency of much of the work makes it necessary for staff to be available quickly to rectify faults. Permanent maintenance staff will be familiar with the conditions of the hospitals and will be able to undertake work with the minimum amount of interference with hospital routines.

42. The main drawback in employing direct labour is the probability that the staff will, at times, be under-employed. This can be overcome as a result of introducing a planned maintenance programme, but unless the total number of directly employed staff is closely related to the planned programme, there will still be idle time. Generally the number of directly employed maintenance staff should be kept to the minimum that will ensure, for all the different trades, an amount of work which will keep them steadily and effectively employed. This will allow the balance of the work, which is likely to be less regular in its incidence, to be placed out to contract in good time.

43. In some hospitals, such as small isolated units in large groups, it may be that all maintenance work should be done by local contractors on an " on call " basis, to avoid incurring excessive unproductive travelling time caused by calling directly employed labour from another hospital or central maintenance unit. There are, however, no hard and fast rules which can be applied to determine whether all or part of the work at a hospital should be done by contract or direct labour. Each case must be considered on the basis of overall standards of efficiency and economy. Before a decision is taken, however, the performance of the direct labour force should be compared with that of the most suitable and efficient contractor.

Contracts for building and general engineering work

44. Even large building and engineering maintenance jobs are comparatively small in relation to the size of many building and engineering firms. Quite often, these large firms are prepared to quote for the work only if it is made particularly remunerative—which results in high tenders. Lower tenders are usually obtained from smaller firms for which the size of job concerned is typical of their normal run of business. There is much to be said in favour of allocating work to contractors from the locality of the hospitals concerned. In most communities there is a sense of pride in local hospitals and this may well be reflected in the quality of work done by local contractors and their workmen.

45. However, there has been a growth of specialisation by some firms in certain aspects of maintenance work, e.g. in wall-washing and in cleaning and maintenance of lighting installations. Such firms, with their specialist staff and equipment, are usually able to quote low prices, particularly if a succession of work is offered.

46. Choosing contractors for particular jobs by means of open newspaper advertisements is often less satisfactory than by selective tendering. The adoption of selective tendering requires the preparation of a sectionalised register of firms interested in quoting for specific types of jobs of particular sizes. The types of jobs might be: general building work, painting, wall-washing, electrical installation, plumbing, etc., and the sizes of jobs: up to £250, up to £1,000, etc. The selection of firms to be invited to quote on each occasion should be according to a formula laid down by the hospital committee, but provision should be made always to include the firm or firms who have submitted the lowest tenders previously and to allow both local and more remote firms to compete. If difficulty is encountered in finding interested firms, assistance can be sought from the Ministry of Works, Regional Hospital Boards and neighbouring hospital authorities.

47. Putting work out to contract will involve the engineer/building supervisor in the preparation of drawings, specifications, contract documents, etc. However, jobs of any size done by direct labour, when properly planned, also involve the preparation of drawings and specifications.

48. The preparation of drawings, specifications and contracts can be much simplified by:

(i) maintaining comprehensive drawings of all buildings, services and site works;

(ii) using standard specifications and conditions of contract for different types of work, possibly using standard forms in which are inserted the appropriate schedules of rates as necessary.

The basis of standard contract clauses for building work can be taken from the R.I.B.A. form of contract, excluding quantities, and that for engineering work from the model form recommended by the Institution of Electrical and Mechanical Engineers. The use of standard contract clauses with standard specification notes can lead to the preparation of simple tender/contract documents. In some cases these might only refer to standard contract clauses. There may well be merit in the preparation of such basic documents, which could operate on a regional basis rather than for each individual authority.

Contracts for plant and equipment maintenance

49. The routine maintenance of plant and equipment can be undertaken by direct labour or contract. The decision should be based on whether there is sufficient maintenance work of particular types (including renovations, etc.) to keep directly employed tradesmen occupied throughout the year. If there is insufficient work to justify the employment of a whole-time tradesman, contractual arrangements should be made for all the work; if there is more work than one tradesman can handle, but insufficient to keep two fully occupied, the most economic arrangement normally is to employ one tradesman on the staff and to put the balance of work out to contract.

50. Many manufacturers of plant and equipment have efficient maintenance departments and provide a service by offering "supply and fix" contract facilities for new equipment, and standard service contracts for subsequent maintenance. Such firms generally offer a high standard of service at an economic cost. The more complicated the equipment concerned, the greater the advantage in using the highly specialised skills of manufacturers' maintenance departments.

51. The cost of travel and travelling time which forms part of the contract charge should be offset by ensuring that there are several similar items of equipment which can all be serviced during one visit; when possible, arrangements should be made to do the work at a central point.

52. The maintenance by direct labour of some types of equipment may require large and varied stocks of spares in the engineer's stores. The cost of maintaining these stores and the associated records can be considerable and constitutes an overhead cost which should not be overlooked when comparative costs of direct and contract labour are examined.

Contracts for the maintenance of services

53. Apart from the inspection and maintenance services offered by Electricity and Gas Boards and the G.P.O., economic arrangements for the maintenance of roads, drains and sewers can often be negotiated with local authorities. The wealth of technical knowledge and experience available in public utilities and local authorities is almost invariably readily offered to hospitals.

IV. Management of maintenance work

Division of responsibility

54. The management of a building and engineering maintenance service calls both for a general control of resources and a detailed control and supervision of a wide variety of individual jobs of varying sizes, often spread over a wide geographical area. The engineer/building supervisor cannot personally perform both these functions effectively, except in small compact groups, and some delegation of responsibility will normally be necessary.

55. The limits of delegation under planned maintenance are clear. The efficiency and economy with which renovations, etc., are done is largely determined by the degree of technical skill with which specifications and drawings are prepared and by the way in which the programme of work is integrated with the routine work of the hospital. The responsibility for directing this work must rest with the engineer/building supervisor. On the other hand, local supervision of routine inspection and maintenance of plant and equipment, and of work arising from contingencies can be delegated. Only when the tests and maintenance reveal the necessity for further action or advice need the engineer/building supervisor be consulted.

56. In some groups the posts of engineer and building supervisor are held by one man. In most larger groups, however, the appointments are separate, and in this case it is essential that each should know:

(*a*) where his responsibility begins and ends; and

(*b*) what the other is doing and is going to do.

The division of responsibility should be clearly

defined and arrangements made to ensure adequate liaison.

57. The allocation of responsibility is reasonably clear for all work except plumbing, some of which might be done either by plumbers under the building supervisor, or by heating, ventilating and domestic engineers (fitters) under the engineer. The plumbers are also directly under the control of the engineer. He can make a suitable allocation of work between them.

58. Studies in large hospital groups have shown that it is usually not a good arrangement to appoint a technical officer to be in charge, as a works superintendent, of two other officers, responsible for engineering and building work respectively. It is rarely possible to find an officer who has adequate knowledge of both branches of work and it is normally better for the necessary co-ordination of plans to be by group administration.

The planning allocation and control of work

59. A time can be set for each task by using time study techniques, either by studying the work whilst it is being done or by working out the task time synthetically by reference to standard elemental time values. However, these techniques are very time-consuming, and whilst their use is justified where work is routine and repetitive, they are less suitable for the kinds of activities involved in a hospital maintenance programme.

60. In practice it is satisfactory to use the technique of "analytical estimating." Broadly, this requires that someone skilled in the work, after adequate training in analytical estimating, should specify how the job should be done (i.e. the method to be employed) and, taking account of each element of the work (viz. dismantling, testing, reassembling, etc.), should estimate what time is required for it. Generally speaking, it should be well within the abilities of a skilled foreman or an experienced engineer or building supervisor to make a reasonably accurate and fair assessment of the time required for the various jobs. These provisional estimates would be checked in the light of experience.

61. Experience in industry indicates that programmes compiled on the basis of analytical estimating are reasonably accurate while taking only a fraction of the time needed where detailed time studies are made. In other respects, analytical estimating is very much more acceptable: there is virtually no interference with the men at work, as is bound to happen if detailed time study is being made, and the men more readily accept the validity of the assessment of someone who is known to be skilled in the work being done.

62. The detailed programmes of work should be designed to produce an even flow of work for all directly employed staff throughout the year; contract work should be integrated to ensure that the correct sequence of jobs is followed. All redecoration jobs should be preceded by a routine inspection and, if necessary, repair or renewal of such items as taps and/or washers, sanitary fittings, light flexes and holders and power points, etc., doors, locks, catches and hinges, windows and sash cords, radiators and pipes, wastes and traps, sterilisers, etc. Each washing down job should be preceded by a lesser inspection of the same items. Repairs or renewals can be done at the time of washing down.

63. Detailed work programmes are required in order to translate the annual programme into monthly programmes showing how work in the different trades is to be allocated. A suitable system to achieve this is described in Appendix B.

Supervision of direct labour force

64. Studies carried out in hospitals suggest that many maintenance tradesmen are only 20–30% effective, mainly because:

(i) a proportion of the work allocated to them is of doubtful value;

(ii) an unduly large proportion of their time is spent in unnecessary travelling, or waiting for instructions or materials;

(iii) adequate tools and equipment are not available;

(iv) insufficient provision is made to provide alternative indoor work should weather conditions interfere with outdoor work;

(v) they are otherwise under-employed.

65. Good supervision of workmen required:

(i) that, so far as possible, the workmen should understand beforehand what is to be done and be allowed the appropriate time in which to do it;

(ii) that adequate technical guidance and assistance is made available as necessary;

(iii) that work should be checked as necessary after it has been completed to ensure it has been successfully done.

66. The amount of supervision which can be given during a job of hospital maintenance work is limited; much of the checking after completion must be delegated to heads of departments, etc. The efficiency of a direct labour organisation depends, however, mainly on the planning of work and pre-job control of workmen. The system of pre-job control should be simple, easily understood by workmen and require little clerical effort on their part. The operation of the system adopted should leave supervisory staff adequate freedom to enable them to make preparations for further work to be done and to undertake some direct supervision of work in progress.

67. It is the usual practice for workmen working at the main hospital to report to a common point,

normally the maintenance workshops, at the beginning and end of each day to change clothes and collect or deposit tools, etc. It is reasonable, therefore, to allocate a day's work to each man at the beginning of each day and to check that it has been done at the end of each day. This can be done by using a combined daily work allocation/time sheet, which can also be used in conjunction with a weekly summary sheet for wages compilation.

68. Work allocation sheets can be prepared as follows:

(i) renovations, etc.—changes in deployment of staff are comparatively infrequent and can be determined from the detailed programme as part of normal supervisory activities;

(ii) routine work—the records for routine inspections and maintenance automatically bring forward daily or weekly work loads with the appropriate time allowances. Balancing the work load with the time available for each man is a simple arithmetical exercise;

(iii) contingencies and breakdowns—as requisitions are received (at 9.30 a.m. each day) they can be vetted by the engineer/building supervisor or assistant and an estimated time for the completion of each job noted on the requisition form. Work loads can then be balanced as for (ii) above.

69. Except where circumstances require immediate action to be taken, the work arising out of contingencies and breakdowns should normally be taken into account in deciding the allocation of work for the following day. Such an arrangement also provides time for the engineer/building supervisor to ascertain clearly what needs to be done and to estimate what time will be required to complete the job.

70. The preparation of work allocation sheets need not involve much clerical effort. The details of renovations, etc., are contained in drawings and specifications and all the work allocation sheet need record is, for example, "Job No. — Ward 4 — partitioning." The instructions for routine inspections and maintenance should be set out in master records and the reference on the work allocation sheet can be limited to, for example, "Reference —, Physiotherapy Department—Diathermy machine—quarterly service." For contingencies and breakdowns, reference need only be made to the department and the requisition number, the requisition, suitably annotated by the engineer/building supervisor, being attached to the sheet as job instructions.

71. Although the work allocation sheets can be prepared by clerical staff, they should be given to workmen by their foreman or chargehand so that necessary additional explanations can be given by them. Similarly, the sheets should be collected by the foreman or chargehand at the end of the day. Any work which has not been completed can then be noted and appropriate arrangements made. When tradesmen are working individually at remote units where no technical supervision is available, routines should be established for reporting progress, receiving further instructions by telephone, and for the prompt submission of completed time sheets to the engineer/building supervisor.

Training

72. Hospitals will generally employ tradesmen who are already fully qualified in the skills of their trades. The working conditions in a hospital are, however, likely to be completely different from those a tradesman has encountered elsewhere. The tradesman should be made aware of the working routine of the hospital so that he will know when best to do his work and appreciate the need to keep noise and disruption to a minimum. He will also be better able to understand the complex framework of authority within a hospital.

73. The confidence which workmen have in the administration as a whole is largely determined by the standard of control exercised by their foreman, who should be trained to:

(i) appreciate the aims which management is trying to achieve;

(ii) understand the system by which it is hoped to achieve them;

(iii) exercise initiative and discretion within defined limits.

74. Studies undertaken in hospitals have shown that planning of maintenance work does not achieve efficiency unless it is coupled with effective day-to-day management by the engineer/building supervisor and his supervising staff. The importance of management training at the appropriate level for all supervisory and controlling staff cannot be over-emphasised. Some Regional Hospital Boards have already recognised the need for such training and have instituted training courses.

Tools and equipment, etc.

75. The wide range of equipment in a hospital can require the provision of special tools and equipment which can hardly be regarded as the craftsman's responsibility to provide even when he receives a tool allowance in his wage. While adequate security is essential, these tools should be available to the craftsman needing them.

76. In some cases it may be advantageous to make up individual tool kits for special jobs, e.g. for servicing floor polishing machines. Besides containing special tools the kit should contain any spares which are frequently required and a copy of the manufacturer's handbook. For general electrical, carpentry and plumbing maintenance, trolleys can be designed to carry appropriate tools and spares, etc., so that workmen can move freely from site to site without

repeated journeys to and from workshops and stores, which can be a most time-wasting and expensive procedure. A daily routine would need to be established for the replacement of spares used.

77. There is merit in duplicating the provision of some relatively inexpensive equipment. For example, duplication of painters' trestles, etc., should ensure that equipment is always available at sites before jobs commence so that painters can move from job to job without incurring delays in waiting for the equipment to be transferred. Similarly, the provision of step ladders at specified points throughout the hospital can eradicate wasted time in looking for, and carrying, ladders from place to place.

78. In scattered hospitals use should be made of fixed quantity substores, particularly for inexpensive materials in constant demand, e.g. lamps. Stock-taking and inventory checking would, of course, be more difficult and, possibly, the risk of loss through petty pilfering greater. It is for the hospital authority to decide the balance of advantage, but where stores are dispersed a simple recorded replenishment procedure should disclose whether abnormally high usage from any particular sub-store merits enquiry.

Transport

79. Where this is required (as at Central Group Works Departments) its use should be planned at least a day in advance to integrate with the proposed deployment of staff on that day. A simple transport instruction sheet, prepared for each vehicle at the same time as work allocation sheets, will be necessary.

Clothing

80. When allocating work to tradesmen the succession of jobs should be arranged whenever possible to avoid the movement of workmen from the service areas to the treatment areas of a hospital, e.g. from the boiler house to the ward, but since it cannot be eliminated entirely, authorities should consider the extent to which special "clean" protective clothing (e.g. warehouse coats, overshoes, etc.) should be made available from a central pool for work in treatment areas.

Break facilities

81. Most hospitals have canteens which are available to maintenance workmen. The peripatetic nature of maintenance work can, however, result in much unproductive time if workmen have to travel to and from work sites to a central canteen: this should be considered when making out work allocation sheets. If workmen are working at a remote site for a period, arrangements should be made to bring them within the normal break routine at that site.

Supervision of contract work

82. The supervision of contractors' workmen is the responsibility of the contractors concerned. Responsibility for ensuring that the drawings and specifications are observed by contractors, however, rests with the engineer/building supervisor. Frequent and detailed inspections of work done by contractors should be made.

83. One of the most frequent causes of contract prices being exceeded is the alteration to specifications and drawings while jobs are in progress. The need for variations can be avoided by full and careful consultation with all parties in preparing drawings and specifications. Should variations subsequently be found necessary their cost should be negotiated with the contractor concerned, as far as possible from a schedule of rates, prior to the work being done. Authorisation of variations should be channelled via the engineer/building supervisor for approval by administration or the Committee and should always be confirmed in writing. Contractors should be forbidden to accept instructions from other than authorised officers, for even minor variations may subsequently give rise to disproportionate and unexpected increases in costs.

84. In building and engineering contracts of any size undertaken in compliance with a detailed specification it is customary to retain a proportion of the contract price for a period following the completion of the contract, during which time any faults due to defective materials or workmanship should show up. The rectification of these defects is the contractor's responsibility within the original contract sum and must be done before the retained monies are paid. The thorough inspection and testing of contractors' work by the engineer/building supervisor is essential before the expiration of the period for which the monies are retained and payment of the final account is authorised.

V. Financial control and administrative arrangements

Financial control

85. In many hospital groups the financial estimates for building and engineering maintenance are based largely on the previous year's allocation, adjusted to allow for wage awards, etc. Only large items of extraordinary maintenance are separately identified and costed. With such a system there is neither a clear justification for the amount of money allocated for maintenance work nor any effective control over the spending of the money.

86. In a planned maintenance scheme, all the work, normal or extraordinary, which is to be done in the financial year is identified and its cost is estimated.

The financial provision is directly related to what needs to be done and, while the amount may remain somewhat similar from year to year, the expenditure is always related to a defined programme. This can be checked against the results actually obtained and budgetary control becomes a more realistic exercise.

87. The method of controlling the allocation of time to specific jobs, described in Appendices A and B to this report, provides a means of controlling the use of time spent on maintenance work by relating it to the amount of time estimated to be necessary to complete the various maintenance tasks. Similarly, the amount of materials issued should be related to an estimate of requirements. There is thus a direct and current control over the two main elements of maintenance expenditure, which should prove a more effective method than a *post facto* judgment of efficiency based on the costing of individual jobs.

88. However, the comparison of the actual cost of maintenance tasks against estimated cost can be valuable—particularly to provide information capable of being compared with the cost of work put out to contract—and the following paragraphs describe costing arrangements which have been found to be valuable by individual hospital authorities.

89. The reasons for costing building and engineering maintenance work in whole or in part are:

(*a*) To obtain the details for recharging the cost of work done for outside bodies.

(*b*) To effect transfers to the capital account.

(c) To allocate charges between hospitals.

(*d*) To ensure jobs are done economically.

(*e*) To indicate when replacement of items or even capital development is economically justified.

(*f*) If necessary, to meet the need for complete departmental costing.

90. In most hospitals job costing to meet some or all of these requirements is carried out, but this represents a relatively small part of the costs of the works department. So long as most of the time of the direct labour force is lost under the anonymity of "general maintenance," information needed by the engineer for management purposes will be missing. For the engineer to exercise effective management control through expenditure analysis, he must be able to compare the actual costs with the figures comprising the annual budget.

91. In a planned maintenance scheme the total budget for building and engineering work under the direct control of the engineer/building supervisor will be spent on:

(*a*) Minor capital work—consisting of a number of individually identified jobs.

(b) Extraordinary maintenance—consisting of a number of individually identified jobs.

(c) Normal maintenance—consisting of:

(i) a number of individually identified jobs;

(ii) routine inspections and maintenance of plant and equipment;

(iii) contingencies and breakdowns.

92. All of the work under (*a*), (*b*) and (*c*) (i) must be costed as individual jobs for control purposes and the total cost of each job can be allocated to the appropriate costing head in financial records.

93. The cost of work done under (*c*) (ii) can be allocated to the appropriate master records for routine inspection and maintenance of each item of plant or equipment, and a simple procedure instituted to ensure that summarised financial records are built up from these records at appropriate intervals.

94. The cost of miscellaneous work under (*c*) (iii) can be allocated to routine inspections and maintenance master records as may be appropriate, or it can be distributed over departments, etc., as required by the financial costing system.

95. Apart from contract work, when the total cost is usually adequate for both control and financial purposes, the cost of each individual job can be sub-divided into:

(i) material costs;

(ii) labour costs;

(iii) overhead costs.

96. There is little difficulty in allocating material costs to particular jobs and this should become even easier as maintenance work is planned and materials are purchased for specific jobs. The use of miscellaneous materials on minor work can easily be identified by making provision on time sheets for the material used to be shown against appropriate jobs. Similarly labour costs are easily ascertainable from time sheets.

97. It should be noted that overhead costs constitute an appreciable proportion of the total cost of all work; the proportion usually being more than 20% even in an efficient organisation. It is important, therefore, that overheads should be accurately assessed and apportioned to each job. They can be divided into three parts:

(i) Those attributable particularly to the use of direct labour and which should be allocated over and above the work of the direct labour force as a whole, including:

(*a*) Sick and annual leave taken by workmen.

(*b*) Unoccupied time.

(*c*) Foremen's time which cannot be allocated to specific jobs.

(*d*) Labourers' time which cannot be allocated to specific jobs.

(*e*) Paid breaks and time allowed for preparing to start and finish work each day which cannot be allocated to specific jobs.

(*f*) Storekeeper's time.

(*g*) Transport costs.

(*h*) Cost of general tools and equipment.

(*i*) Miscellaneous materials not charged to specific jobs, e.g. nails, screws, etc.

(*j*) Employers' superannuation and N.H.I. contributions which can be assessed by the Finance Officer and included as an annual total.

(ii) Overhead costs attributable to the work of the maintenance dept. as a whole, irrespective of whether it is done by direct labour or contract, which should be shared on a proportional basis, particularly so that recovery of the appropriate amount can be made from any outside bodies for whom work has been done. These overheads, which can be assessed annually, are made up of:

(*a*) Engineer's and building supervisor's gross salaries (including employers' superannuation and N.H.I. contribution).

(*b*) Hospital engineers' gross salaries.

(*c*) Clerical staff gross salaries.

(*d*) Office expenses.

(iii) Indirect overheads, such as workshop accommodation, lighting, heating, which can be assessed on a mainly arbitrary basis, so that they can be taken into account for the purpose of contract cost comparison and recharging expenditure.

The overheads for each category should be calculated as a percentage addition to the direct costs, and used as a basis for charging overheads in the succeeding year.

98. The allocation of the total cost of the maintenance department should be reviewed at least annually by the administration to ascertain that:

(i) the division of resources between renovations, routine inspections, etc., and contingency maintenance is satisfactory; and to initiate action to correct any disbalance;

(ii) the direct labour force is working economically compared with contractors and to take action to improve efficiency or switch more work to contractors if necessary;

(iii) the maintenance costs incurred on all departments and equipment are reasonable, particularly in regard to capital outlay which, alternatively, would be involved in rebuilding, or replacing plant or equipment.

These reviews should normally be undertaken shortly after the end of the financial year and before the preparation of the next financial estimates, so that the estimates can be compiled in the light of up-to-date factual information and resultant policy decisions.

Administrative arrangements

99. An efficient building and engineering maintenance service cannot be provided by an engineer or building supervisor working in isolation. It requires the full support of the hospital authority and active co-operation of the heads of the different departments, and the hospital and group secretaries.

Clerical support for engineer/building supervisor

100. The prime responsibility for the day-to-day management of maintenance work and for the preparation and submission of management data to administration rests with the group engineer/building supervisor. To discharge this responsibility he should:

(i) be in attendance at committee meetings when building and engineering maintenance is discussed; and

(ii) have sufficient clerical assistance to enable him to perform his administrative functions.

101. Efficient management of maintenance work must be based on a complete knowledge of all the buildings, plant and equipment. The technical work involved in preparing drawings, specifications, etc., will cause a fair proportion of the engineer/building supervisor's time to be spent in the office. He should be relieved from all routine clerical work so that he may have time to visit and inspect all premises and to control his department. All clerical work and records should be centralised in order to maintain the engineer/building supervisor's overall control, except where directly employed staff are dispersed throughout the group, when custody of routine inspection and maintenance records will have to be left to the hospital engineers.

102. The effectiveness of the engineer/building supervisor's control will, to a great extent, depend on up-to-date and accurate records. The engineer/building supervisor should be assisted by an officer in the clerical or higher clerical grade. Clerical support at a lower level needs to be matched to work loads by employing storekeeper/clerks and clerk/typists.

103. Where engineer and building supervisor are separate appointments the clerical and stores facilities should be shared to facilitate co-ordination and in the interests of economy.

Control of programme

104. The administrative arrangements needed in the preparation of maintenance plans have been described earlier in this Memorandum. Each departmental head would be responsible for the submission of work demands for his department; each hospital secretary for the co-ordination and primary vetting of proposals for his hospital; and group administra-

tion would be responsible for the co-ordination and examination of demands arising from all hospitals in order to produce a comprehensive plan for submission to the Hospital Management Committee. The engineer/building supervisor should give technical assistance and advice at all these stages, in addition to submitting proposals on items with which he is directly concerned.

105. Plans for maintenance work drawn up some six months before the commencement of the year in which they will be implemented will unavoidably suffer some modification when the work comes to be done and there are quite likely to be demands for changes, some of which may not be justified.

106. Whilst the engineer/building supervisor has responsibility for detailed implementation of the maintenance programme the group secretary has a clear responsibility to satisfy himself as to its satisfactory progress and the appropriate Committee of the Hospital Management Committee will wish to be kept informed of the way the work is progressing. The general aim should be to keep modifications to the plan to the minimum and, when drafting plans in the first place, to anticipate snags which might occur. An effective method adopted by one Hospital Management Committee to achieve this is described in Appendix C and specimens of the different forms used are given also.

107. Apart from general control, the administration will also need to exercise control over individual jobs. The circumstances prevailing when various jobs were included in the comprehensive plan some six to eighteen months previously may have changed, and it will therefore be necessary for each main task to be reviewed before it is undertaken and for approval to be given for its performance. *Ad hoc* requests for additional services should be approved individually by the group secretary or the hospital secretary as appropriate, or if necessary by the hospital authority. The point at which approval should be sought from higher authority is usually best related to the cost of the work. The cost limits need to be carefully chosen to ensure that, whilst they result in effective control being exercised, they do not unnecessarily hamper the smooth execution of the work programme.

Purchasing and stock control

108. The range of stock and spare parts required by a direct labour maintenance organisation in a hospital is considerable. On the other hand, the numbers of each individual item held are usually quite small and the cash value of each is, except in isolated cases, comparatively insignificant. Unless care is exercised there is a danger that the cost of purchasing and stock control procedures will be out of proportion to the value of the stocks which are held.

109. Most jobbing maintenance contractors use builders' merchants as their stock holders and are relieved of the responsibility of holding large stocks of items themselves. In the same way hospitals can reduce the level of general stock which they hold by placing annual contracts (on trade terms less a small discount) with large builders' merchants and ironmongers, etc. This will have the incidental benefit of avoiding waste of technical or clerical time in deciding where to place an order or in trying to obtain a higher rate of discount where the yield is insignificant in relation to the effort involved. Where urgency is a factor in getting hold of particular items the well-established commercial lines of communication between manufacturers and merchants are usually most effective, particularly as merchants will often make a special effort to assist a hospital.

110. Although technical considerations require that ordering of building and engineering materials should be done by the engineer/building supervisor, the expertise of the supplies officer should be used in arranging the contract. Conversely, when purchasing any equipment, including furniture, on which the onus for installation and/or maintenance rests with the engineer/building supervisor, the supplies officer should seek the technical advice of the engineer/building supervisor so that these considerations are taken into account at the outset.

111. When maintenance work is planned, materials can be purchased in advance. In these circumstances the purchases need not be recorded through the stock control system; a considerable proportion can be charged direct to the job and held in the stores under job numbers. For example, paint requirements for the year can be summarised job by job for the year and purchased as a bulk supply without the need for elaborate paint stock records. At any time, and particularly at the end of the financial year, the stocks held can be checked against the unused materials charged to uncompleted jobs, so that the finance officer can satisfy himself that financial and security requirements are being met. In directly controlling the major works the engineer/building supervisor will himself be able to exercise direct control over the bulk of ordering without the need for elaborate liaison arrangements with his subordinates.

VI. Conclusion and summary

112. Experience in industry and in a number of hospitals which have started to install planned maintenance systems indicates that there are great advantages to be obtained from planning maintenance work and that:

(1) It is necessary that the job of specifying maintenance requirements should be undertaken by experienced technical staff.

(2) Adequate administrative and clerical support to the technical staff is essential to help in setting up the main system of records and subsequently in operating the arrangements.

(3) It is possible, and probably advantageous, to evolve a programme either area by area of the hospital, or trade by trade.

(4) The introduction of a planned maintenance system is likely to result in a temporary increase in the total volume of work for one to two years.

(5) As soon as a planned maintenance system is fully operative, the improved standard of management is likely to result in more effective use of the maintenance labour force.

(6) There will be marked improvements in the upkeep of buildings, plant and equipment, with a considerable reduction in interruptions to medical and nursing activities due to breakdowns.

(7) A more realistic appreciation of technical, administrative and financial needs is possible.

113. This Memorandum has discussed in some detail the nature and the advantages of planned maintenance. A sensible by-product of planned maintenance will be the feeding back to architects and engineers the lessons which emerge from its operation so that efforts can be made at the planning stages of new hospital buildings to eradicate the causes of recurring faults which increase the costs of maintenance work.

114. So far as general maintenance work is concerned, there is no doubt from the evidence collected during the studies which form the background of this Memorandum that an organised and planned programme of maintenance work is very much more economical and efficient than the more customary method of providing maintenance services on a relatively day-to-day basis.

115. Trials have been carried out over a period of a year with a pilot scheme for the planned maintenance of engineering services in a large London teaching hospital, St. George's Hospital, in which the Board of Governors co-operated with the Engineering Division of the Ministry. This system is described in detail in Hospital Technical Memorandum No. 13 on Planned Preventive Maintenance: A System for Engineering Plant and Services, soon to be published.

APPENDIX A

The annual plan

1. Table 1 which follows shows a way of bringing together, in an annual programme, the ascertained requirements for renovations, etc., routine maintenance, plant and equipment maintenance, and an allowance for contingencies and breakdowns.

2. The table shows what needs to be done and the financial and manpower resources needed. In the first year or two after the introduction of this form of planning it is likely that arrears of work will be brought to notice. It will be necessary to spread this load over a few years to keep the annual amounts at a reasonably constant level.

3. The assessment of the number of men required in the trade will not always accord with the numbers which the authority is committed to employ or is able to recruit, and it will be necessary to match the work to be done with the amount of labour available. In the first year or two, therefore, the staff estimates will perhaps more reflect the staff needed than the staff available.

4. Adequate allowance must be made at the planning stage for non-productive time, e.g. time needed for annual and sick leave, paid breaks, and an acceptable amount of waiting time.

TABLE 1

Comprehensive plan of work for each hospital

Job	*Total estimated cost* £	*Contract work* £	*Materials cost* £	*Direct labour work* — *Labour costs*						*Direct overhead costs* £
				Elect. £	*Fitter* £	*Carp.* £	*Painter* £	*Etc.* £	*Etc.* £	
Renovation, etc.										
No. 1	250	—	35	5	10	—	150	—	—	50
No. 2	500	500	—	—	—	—	—	—	—	—
No. 3	180	—	50	80	20	—	—	—	—	30
No. 4	375	—	50	—	—	—	250	—	—	75
Etc.										
Etc.										
Total of renovation jobs (say) ..	17,500	6,500	2,500	1,200	1,200	600	2,900	—	—	2,600
Add										
Provision for routine maintenance (say) ..	2,800	1,300	300	450 ($\frac{3}{4}$ W/T)	450 ($\frac{3}{4}$ W/T)	—	—	—	—	300
Provision for contingencies and breakdowns (say) ..	1,250	—	200	300	300	—	200	—	—	250
Total cost of Hospital Plan (say)	21,550	7,800	3,000	1,950	1,950	600	3,100	—	—	3,150

—equals 5 whole-time painters

—equals 3 whole-time fitters

—equals 3 whole-time electricians

APPENDIX B

Production of a monthly work programme

1. Detailed work programmes can be produced in two stages. The first stage is to allocate all the jobs included in the annual plans (including the provision for routine and contingency maintenance) to the months of the financial year in which they will be carried out having regard to the convenience of the wards and departments of the hospital and to the labour force available. For example, this could be set out as shown in Table 2 below.

2. The second stage would be detailed advance programming of each month's stint of work to fit in with the functional requirements of the hospital and to provide daily schedules for the deployment of the labour force. This could be achieved by scheduling work as shown in Table 3. In preparing such a schedule provision would be required to carry over jobs from one month to the next and from a practical point of view it would not be possible to complete detailed schedules as in Table 3 more than about 2 months in advance.

3. Provision would need to be made for annual leave and sick leave (which would vary in different months of the year) but, with these adjustments, it should be possible to produce schedules which provide a practical working programme for the labour force available.

4. The preparation of the schedules requires a fairly accurate standard of estimating by the engineer/building supervisor but not to an extent which is greater than is required by any commercial concern working to competitive tenders. Even so some variation from the estimated times is to be expected, but such variations will normally cancel out. It would be helpful to alternate large jobs with a number of small jobs because the latter can be moved up or down in the programme more easily to adjust for errors in estimating the times of the larger jobs.

5. When a planned engineering maintenance system is instituted on the lines described in Hospital Technical Memorandum No. 13, Planned Preventive Maintenance: A System for Engineering Plant and Services, work programmes are produced by means of a " bring up " card index on a weekly basis. The engineering maintenance provision shown in the tables may then be related to non-routine engineering work only.

TABLE 2

Breaking down annual programmes to monthly programmes

	April, 1964						*May et seq. . . .*			
	Working days									
	Elect.	*Fitters*	*Carp.*	*Plumb.*	*Brick.*	*Painters*				
Total availability	44	44	44	22	22	132				
Commitments for routine inspections, etc.	22	22	—	—	—	—				
Allowances for contingencies and breakdowns . .	3	3	5	5	3	3				
Job No.:										
1	1	1	1	1	3	24				
2	1	—	—	1	—	20				
3	10	—	—	—	—	—				
4	1	16	—	2	6	40				
5	1	1	20	2	10	25				
6	2	1	16	2	—	10				
7	6	—	1	8	—	10				
Totals . .	47	44	43	21	22	132				
Balance . .	3	—	1	1	—	—				

TABLE 3

Planning daily deployment of labour

Job. No.	*April*																					
	1	2	3	4 S	5 S	6	7	8	9	10	11 S	12 S	13	14	15	16	17	18 S	19 S	20	21	*et seq.*
1	3	3																				
2	3	3																				
3			6	6	6	6	6	6	6	6												
4													4	4	4							
Painters 5													2	2	2	2						
6																4	6					
7																				3	3	3
8																				3	3	3
9																						
Total painters	6	6	6	6	6	6	6	6	6	6	—	—	6	6	6	6	6	—	—	6	6	6
1	PREVIOUS MONTH																					
2	PREVIOUS MONTH																					
3	1	1																				
Electricians 4						1	1	1	1													
5							1	1														
6													1									
7														1								
Routine and breakdowns	1	1	2			1	1		1				1	1								
Total elect.	2	2	2	—	—	2	2	2	2	2	—	—	2	2								
1	PREVIOUS MONTH																					
2	PREVIOUS MONTH																					
3	1																					
Carp. 4		1																				
5			1																			
6										1												
7								1	1													
Breakdowns						1	1															
Total carps.	1	1	1	—	—	1	1	1	1	1	—	—										

APPENDIX C

Control over implementation of programme

1. A good system of control over the implementation of the maintenance programme which has been in use at one Hospital Management Committee for the last few years, and which integrates with the planning of work as set out in paragraphs 33 to 39, is described below.

2. The programme of works agreed for a financial year is set out in the form depicted at Appendix C.1. From the specimen entries in the Appendix C.1 it will be seen that two categories of job are provided for; those which it is intended to do in the current financial year and those which could be done should finance become available. Direct labour jobs and contract work are shown separately, but where contract work and direct labour jobs require to be co-ordinated the fact is denoted by an asterisk in the Provisional Cost Columns.

3. During the course of the financial year jobs costing less than £30 included in the plan may be started at the discretion of the Engineer, and jobs costing from £30 to £100 may proceed with the approval of the Group Secretary: both of these being subject to subsequent ratification by the appropriate sub-committee. Jobs costing £100 or more receive the prior approval of the sub-committee before they are commenced. The impending commencement of each job is notified to the group secretary by the engineer or building supervisor using the type of form depicted at Appendix C.2, each passing the notification via his opposite number. This system not only ensures that approval is given at the appropriate level but also that the engineer and the building supervisor are each aware what the other is doing so that work can be properly phased and co-ordinated.

4. Each month the sub-committee receives a statement of cost of completed jobs for comparison with the estimated cost, and wide divergencies between the two are examined in detail.

5. In addition, at intervals throughout the financial year the progress towards completion of the programme of works as a whole is examined by the sub-committee when it receives progress reports in the form depicted at Appendix C.3. At intervals throughout the year, but mainly as a result of these progress reports, action is taken to correct any discrepancies which have arisen between the programme of works remaining to be done and the remaining financial provision. Some jobs may be abandoned or postponed either because of unexpected excess costs incurred on jobs so far undertaken or for some other reason, or reserve jobs may be authorised to be done because of underspending to date or an unexpected change of priorities has occurred.

6. This system of control ensures that within reasonable limits the amount of expenditure on building and engineering maintenance coincides with the financial provision made.

APPENDIX C.1

Specimen layout of maintenance programme

** Denotes that the item appears in both direct labour and contract*

Direct labour				*Contract*				*Remarks*
Description of work	*Prov. Estimate*	*Committee Approved*		*Description of work*	*Prov. Estimate*	*Committee Approved*		
		Date	*Cost*			*Date*	*Cost*	
	£				£			
"X" HOSPITAL								
Decoration of female ward	350			Repairs to private ward	160			
Washing down wards, theatre, etc. ..	125			Anti-static flooring for labour ward ..	250			
†Decoration of cottage	*200			Repairs to cottage	*220			† Last done in 1952.
Reserve items:				*Reserve items:*				
‡ Decoration of sisters' and nurses' bedrooms	150			Concreting area by back door	50			‡ Last done in 1953.
				Re-arrangement of main kitchen ..	350			
"Y" HOSPITAL								

APPENDIX C.2

Notification to secretary of building and engineering works costing more than £20

NOTE: *Drawings and specifications to be attached where applicable*

HOSPITAL | DEPARTMENT | NORMAL / URGENT

BUILDING WORK

Estimated Cost
£ s. d.

Labour .. ..
Materials .. ..
On cost .. .. ..

Total .. £

Details of tenders for work (or portion of work) to be given out to contract:

Name of firm	Work	Amount	Recommended tenders

Date..... Signed ..... Building supervisor

ENGINEERING WORK

Estimated Cost
£ s. d.

Labour .. ..
Materials .. ..
On cost .. .. ..

Total .. £

Name of firm	Work	Amount	Recommended tenders

Date..... Signed ..... Group engineer

There is no engineering/building work connected with this project.

Date..... Signed .....
Group engineer/building supervisor

Approved by Secretary (under £100)

Approved by Committee on .....

Date..... Signed ..... Secretary

APPENDIX C.3

PROGRESS REPORT—October

Hospital	*Programme items*		*Additional work completed or approved by Committee*
	Completed or approved by Committee	*Not yet approved*	
"X" HOSPITAL ..	Internal and external decorations of hospital cottage Decoration of wards, labour wards, theatres, etc. Decoration of sisters' and nurses' bedrooms		Reflooring of various departments. Renewing sluices.
"Y" HOSPITAL			

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